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A Q U A P H Y T E



UNIVERSITY OF
FLORIDA

Institute of Food and Agricultural Sciences

CENTER FOR AQUATIC PLANTS

With Support From

The Florida Department of Environmental Protection,
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Wetlands Delineation In Florida Usually Depends on Plants

In Florida, determining the "landward extent of wetlands and surface waters" became easier with new delineation laws which came into effect in July 1994. The Florida Department of Environmental Protection (DEP) is responsible for ensuring statewide coordination and consistency in delineating surface waters and wetlands, and has established methodology rules that include using a "vegetative index", hydric soils and hydrology to determine where wetlands begin and end.

(DEP's delineation methodology is spelled out in Chapter 62-340 of its rules and regulations. The wetlands laws upon which the DEP rules are based are Florida Statutes 373.019 and 373.421. DEP is also responsible for providing wetlands training and guidance to water management districts and local governments in Florida.)

The first step in determining whether a place is a wetland or not under the new rules is for someone using "reasonable scientific judgement" and having "all reliable information" to decide if the place is a swamp, marsh, bayhead, bog, cypress dome or strand, slough, wet prairie, riverine swamp or marsh, hydric seepage slope, tidal marsh, mangrove swamp or "other similar area". The place must have a "prevalence of vegetation typically adapted for life in saturated soils"; that is, "facultative or obligate hydrophytic macrophytes...that have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions". "If the boundary cannot be located easily" in this way, then the further methods described in Chapter 62-340 apply.

Chapter 62-340 includes a vegetative index which mostly lists aquatic macrophyte species and trees. Under "obligate species", some 272 genera and species are listed. Under "facultative wet species", another 310 genera and species of plants are listed. Two other lists apply only to Monroe County and the Key Largo portion of Dade County, and include an additional 156 "facultative wet" genera and species and 11 "facultative" species.

In addition to simple expert declarations that are encouraged under the laws and rules, the extents of wetlands and surface waters can also be determined in any of four additional ways:

The first way under 62-340 to determine where a wetlands is requires that the aerial extent of "obligate plants" (listed) be greater than 50% of all plants present in the stratum, and requires the presence of either a hydric soil or a hydrologic indicator.

The second method requires that the aerial extent of obligate or "facultative wet plants" (as listed) be equal to or greater than 80% of all plants in the stratum, plus the presence of a hydric soil or a hydrologic indicator.

A third way to determine the extent of a wetland requires the presence of *undrained* hydric soils, as classified by United States Department of Agriculture (USDA) soil taxonomy, or as shown in USDA-Soil Conservation Service hydric mapping. Or the

[See NEW WETLANDS LAWS on Page 15]

APIRS Online Soon

As announced last November, the APIRS office is accessible by e-mail at:

VARAMEY@NERVM.NERDC.UFLEU

About one-quarter of APIRS' business is now conducted through the Internet. In the near future the aquatic plant database will also be accessible via gopher, mosaic, telnet and modem.

Thanks to support from the Aquatic Plant Control Research Program (U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS), new computers and systems are being installed to place the APIRS database and services online 24-hours-a-day. Even users on the other side of the world will be able to access APIRS services anytime via the Internet.

By the end of 1995, the APIRS "home page" will enable users to access the 40,000-item aquatic plant database; the copyright-free line drawings of aquatic plants; and a collection of several hundred color images of more than 200 freshwater plant species. Future pages will enable user access to facsimile files of informational brochures and out-of-print reports, as well as to video clips relating to freshwater plant ecology, biology, control and utilization, as well as scenes of Florida's natural landscapes.

Information about these changes will be included in the next issue of *AQUAPHYTE*.

Alternanthera to Zizaniopsis

Digitized Aquatic Plant Photographs Available

In the spirit of our copyright-free line drawings, the **APIRS** office is now making available computer graphics files of aquatic plant photographs for *not-for-profit educational use*.



As of now, 364 aquatic plant images of 192 species are in the **APIRS** digital collection.

Each image is readily available in three resolutions: 128 X 192 dpi; 256 X 384 dpi; and 512 X 768 dpi. Higher resolution files (to 2048 X 3072 dpi) are available by special arrangement. The images are suitable for display on computer monitors; for input into brochures, booklets and other not-for-profit publications; and for slide/photograph production. Users of this **APIRS** service are limited to five images at a specified resolution. As of now, there is no charge.

These digital image files are available in PCD, TIF, GIF, JPG or PCX image formats, and are distributed uncompressed on IBM compatible 3.5" disks. If necessary, arrangements can be made to transfer requested files via FTP on the Internet.

Of course, users need to have "photo/paint programs" or "graphics viewers" installed on their computers in order to display and use these computer files.

In exchange, users are expected to acknowledge the source of these free images in any productions in which they are used.

For more information, and a listing of the images available, contact the **APIRS** information office at the address on page 16, or email to VARAMEY@NERVM.NERDC.UFL.EDU

If you are interested in *purchasing* a set of CDs containing aquatic plant computer image files, please see below.



Aquatic Plant Photo CDs

Advance Order Form

Would you like to have your own stock library of aquatic plant photographs that can be used for non-commercial or commercial use? High-res, royalty-free photos that can be viewed on your own computer's monitor, or that can be downloaded for use in desktop publishing or in computer-aided training applications?

If you have a PC- or MAC-compatible computer with a CD-ROM drive and a VGA (or better) monitor, you may be in luck!

The **APIRS** office has produced a four-CD set of 364 color images of 192 freshwater plant species. We are considering reproducing these CDs and selling them in sets. But before we can decide, we need to know how much interest for them there is out there.

Each compact disc includes approximately 100 photos in five resolutions. Resolutions for each photo include 128 X 192 dpi; 256 X 384 dpi; 512 X 768 dpi; 1024 X 1536 dpi and 2048 X 3072 dpi. All digitized photos are in the Kodak Photo-CD format (*.PCD). The PCD format may be "read" by any number of common "paint" programs such as Photoshop, Photostyler, Corel, etc., and then, of course, can be saved as other formats such as PCX, TIF, BMP, JPG and PIC.

We expect to sell the 4-CD set for \$100 plus tax and S/H.

If you wish to be informed if/when this aquatic plant photo CD-set becomes available, please complete this form and send it to the **APIRS** office as soon as possible. Or e-mail us at VARAMEY@NERVM.NERDC.UFL.EDU

AQUATIC AND WETLAND PLANTS - 4-CD SET

Non-Binding Advance Order Form

I am interested in learning more about this product if/when it becomes available.

Name _____

Affiliation _____

Address _____

E-mail _____

A T T H E C E N T E R

Torpedograss Targeted

Torpedograss (*Panicum repens*) now covers approximately 6,000 hectares of the 40,000 hectare littoral zone in Florida's largest lake. The exotic, perennial weed has displaced native sedge and rush communities and continues to invade new areas of Lake Okeechobee. **Dr. Kenneth Langeland** and assistant **Mr. Brian Smith** are targeting torpedograss in a three-year research project.

Extensive rhizomes comprise 70-90% of the total biomass of torpedograss. To effectively control the weed, herbicide must be absorbed and translocated to the rhizomes in sufficient concentrations. The registered herbicide glyphosate will be used in the study. The researchers intend to study the efficacy of seasonal herbicide treatments, the correlation between leaf exposure and herbicide toxicity, herbicide surfactants and 'rain-fasteners' (glyphosate requires a three day rain-free period for optimum results), and plant growth regulators to manipulate the growth and development of rhizomes for more effective herbicidal control.

Langeland and Smith hope to develop new management strategies which can be used to yield long-term control of the weed. The work will be funded by the South Florida Water Management District.



Vegetation drifting downstream was sampled using 2-meter wide nets.

Rainbow River Study

Designated as a National Natural Landmark, an Outstanding Florida Water and a State Aquatic Preserve, the Rainbow River is one of the largest spring-fed rivers in Florida. **Dr. Charles Cichra** (Fisheries and Aquatic Sciences), **Mr. Jeff Sowards** and graduate student, **Mr. Mike Mumma**, in cooperation with **Dr. Steve Holland** (UF Department of Recreation, Parks and Tourism), recently completed a study to determine the impacts of recreation on the water quality and the aquatic plant community in the river. Although the river is heavily used for motorboating, canoeing, fishing, swimming, tubing and SCUBA diving, they concluded that no significant damage is occurring.

The researchers studied changes in suspended solids, dissolved oxygen and water clarity in response to recreational activities. They also studied the effects of recreation on aquatic plants which are torn or uprooted. The river has an abundant population of both *Sagittaria kurziana* and *Vallisneria americana*. *Potamogeton illinoensis* is common only in the headsprings area. *Hydrilla verticillata* is present throughout much of the river and appears to be increasing. In addition to addressing the effects of users on the river, the study has established a baseline water quality and aquatic plant community database for the river.

The work was funded by the Florida Department of Environmental Protection, Division of Recreation and Parks.



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MEETINGS

35TH ANNUAL MEETING - AQUATIC PLANT MANAGEMENT SOCIETY. July 9-12, 1995. Seattle, Washington.

This year's meeting will be held at the Hyatt Regency Hotel in Bellevue, Washington. To submit a paper, contact Terry McNabb, APMS Program Chair, Resource Management, Inc., 2900-B 29 AVE SW, Tumwater, WA 98512, 360/754-3460. For pre-registration information, contact Wendy Andrew, APMS Secretary, POB 121086, Clermont, FL 34712-1086.

HABITAT FRAGMENTATION & INFRASTRUCTURE, International Conference. September 17-21, 1995. Maastricht, The Hague, THE NETHERLANDS.

"Infrastructure" is one of the principal causes of the fragmentation of nature. The aim of this conference is to present an overview of how highways and other infrastructures fragment nature in different countries. The program is aimed at scientists, consultants and those involved in mitigating problems in nature caused by infrastructure.

The meeting is sponsored by the Dutch Ministry of Transport, Public Works and Water Management, in cooperation with the International Ecological Engineering Society (IEES) and the Ecological Society of the Netherlands and Belgium (NEVECOL).

For information, contact the Congress Office ASD, PO Box 40, 2600 AA Delft, THE NETHERLANDS. voice: 31/15/120234; fax: 31/15/120250

NORTH AMERICAN LAKE MANAGEMENT SOCIETY, 15TH INTERNATIONAL SYMPOSIUM. November 6-11, 1995. Toronto, Ontario, CANADA.

The theme for this year's conference is "Aquatic Ecosystem Stewardship". Sessions will be organized into "technical" and "lake user friendly" themes. The deadline for the first call for papers is June 1, 1995. For information about presenting papers, contact N.Hutchinson, Ontario Ministry of Environment and Energy, Dorset Research Centre, POB 39, Bellwood Acres Road, Dorset, Ontario, CANADA POA 1E0. voice: 705/766-2418; fax: 705/766-2254.

SHALLOW LAKES '95, International Conference on Trophic Cascades in Shallow Freshwater and Brackish Lakes. August 21-26, 1995. Mikolajki, POLAND.

This meeting continues the work of the international conference on shallow lakes held in Silkeborg, Denmark in 1992. It will cover all aspects of shallow lake research such as lake succession, nutrient dynamics, trophic relations, stable states, and bio-restoration practices.

The conference will be conducted in English and will be hosted by the Mikolajki Hydrobiological Station of the Institute of Ecology. It will be chaired by Lech Kufel, Andrzej Prejs and Jan Igor Rybak.

For more information, contact Lech Kufel, Institute of Ecology, PAS, Hydrobiological Station, Lesna 13 11-730 Mikolajki, POLAND.

THE ECOLOGY OF LARGE RIVERS, First International Symposium. April 18-22, 1995. Krems, AUSTRIA.

The main sessions of this symposium are: community and population ecology in rivers, process studies, river hydraulics and sediment transport, production in larger rivers, large river research case studies, a poster session and two workshops to incorporate the comments of session chairmen.

The program is being organized by the Austrian Committee of the International Association on Danube Research, the Freshwater Biological Association and the Danube University Krems. It will be held on the grounds of Danube University.

For more information, contact Austrian Committee of the International Association on Danube Research, c/o G. Burget, Schiffmullenstrasse 120; A 1220 Wien, AUSTRIA: 234591/15.

19TH ANNUAL MEETING - FLORIDA AQUATIC PLANT MANAGEMENT SOCIETY. October 10-12, 1995. St. Petersburg, Florida.

For information, contact Nancy Allen, 904/795-2239.

Getting to Know the Natives

RUPPIA vs POTAMOGETON

by Kathy Craddock Burks, Botanist, Technical Services, Bureau of Aquatic Plant Management, Florida Department of Environmental Protection, 3917 Commonwealth Blvd., MS 710, Tallahassee, FL 32399, 904/487-2600.

In clear brackish waters along Florida's coasts, *Ruppia maritima* (wigeongrass) is a common submersed aquatic, forming "grassy" beds with its thin, much-branched stems and many threadlike leaves. It often occurs with--and is often confused with--the much-branched and slender-leaved pondweed, *Potamogeton pectinatus* (sago pondweed).

Both have a delicate, flexuous habit in the water column; both have very narrow alternate leaves with stipular sheaths (extra leaflike tissue attached to the leaf bases). Shoots in both species arise from slender rhizomes, and the flowers are somewhat similar in appearance, especially when young. In fact, most European and Australian taxonomists place *Ruppia* in the pondweed family, Potamogetonaceae, rather than in a family of its own, Ruppiaceae, as many researchers do here in the United States (a few place it in the eelgrass family of Zosteraceae).

Despite their casual resemblance, these two species can be distinguished in the field with a closer look at certain characters. For example, the rhizomes of *P. pectinatus*, which may become thickly matted, often terminate in small round tubers (bulblets) which eventually break away as vegetative propagules. Although *R. maritima* also colonizes by rhizome extensions (and by easily rooting stem fragments), it does not form tubers.

The stipular sheaths of the two species differ considerably as well. On *R. maritima*, the sheath ranges in length to 1.5 cm (5/8 in.) with the free portion, i.e., the tip end not attached to the leaf base, being very short. On *P. pectinatus*, the sheath ranges from 2 to 5 cm (3/4 to 2 in.) long, with the free portion 1 to 3 cm (3/8 to 1 1/4 in.) in length.

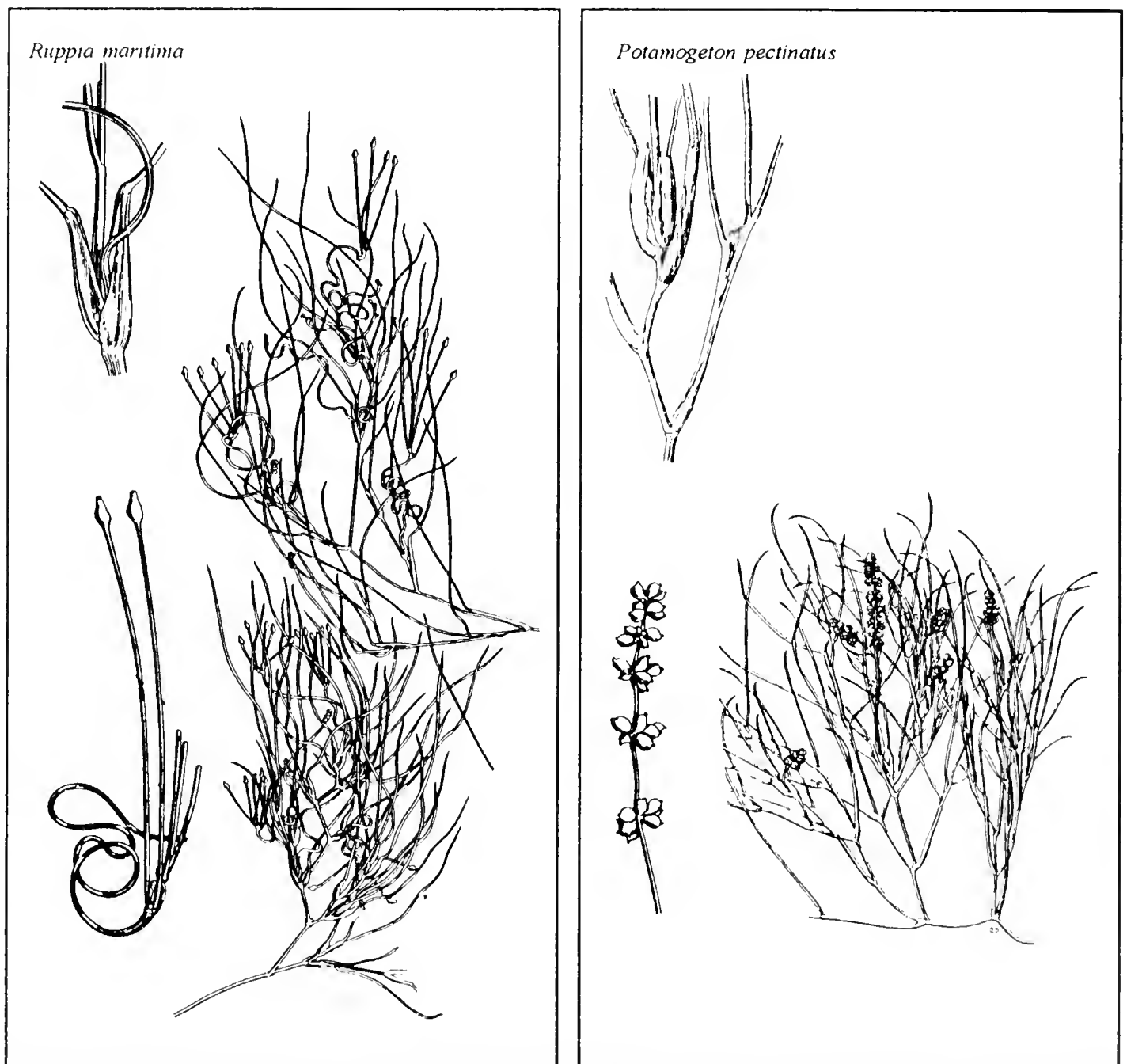
Perhaps the easiest feature to compare, when the plants are sexually reproducing, is the arrangement of the tiny fruits. The dark, oval drupelets of wigeongrass are individually stalked, while the crusty, broadly oval achenes on sago pondweed occur in sessile (unstaked) clusters on the inflorescence spike (peduncle). The main flower stalks for both species (peduncles) will elongate during the flowering and fruiting process, but that of

wigeongrass may reach about 10 dm (3 ft.) in length and become coiled to bring mature fruit back beneath the water's surface. An array of 7 or 8 stalked drupelets on the end of a long peduncle brings to mind another common name used for *R. maritima*--tassel grass, or tassel pondweed.

A few other slender-leaved submersed aquatics of brackish waters might be confused with these two species. Nearer freshwater may be an occasional patch of the sago pondweed's cousin, *P. pusillus*, which has no rhizomes and whose stipular sheaths are free, or unattached. Also occasional is the horned pondweed, *Zannichellia palustris*, which has opposite rather than alternate leaves and flowers clustered in leaf axils rather than on stalks.

One important characteristic all of these species have in common, particularly wigeongrass and sago pondweed, is the wildfowl food and underwater habitat they provide.

For more information, contact the Bureau's Technical Services section at the address above.



Both illustrations above taken from *Aquatic and Wetland Plants of Southwestern United States*, Vol. 1, by D.S. Correll and H.B. Correll. 1975. Stanford University Press. Used with Permission.

ElectroPhyte

By next year, the APIRS aquatic plant database will be online and available directly through modem, or through the Internet. Our current e-mail address is:

VARAMEY@NERVM.NERDC.UFL.EDU

Already there are electronic resources about plants available to those with computers, modems and knowledge of how to use them.

Below is a listing of some bulletin board systems (BBS), "list servers" and World Wide Web hypertext pages about plants, and related subjects:

Aquatic Plant Bulletin Board System (APBBS)

This new BBS is managed by the U.S. Army Corps of Engineers, Center for Aquatic Plant Research and Technology (CAPRT), at the Waterways Experiment Station in Vicksburg, MS.

It provides users "an abundance of aquatic plant information", and can get you in touch with Corps aquatic plant managers and researchers. Using APBBS, it is also possible to conduct online discussions and meetings.

The APBBS number is 601-634-3018. Set your communications software to 28,800 baud or less, 8 bits, no parity, 1 stop bit. New users will be asked several questions to register. Usage is limited to 60 minutes per day per person.

If more information is needed, contact Carolyn Schneider, System Operator, at 601/634-3657, or Bob Gunkel, Assistant Director--CAPRT, at 601/634-3722.

Florida State Legislature BBS, On-Line Sunshine

This new BBS enables legislators as well as ordinary citizens to access state documents, including current law and the constitution, pending bills and bill history, and information about individual legislators.

As of now, only eight slow (2400 B) phone lines are available to the public, and calls may be only 30 minutes long. But unless one knows *exactly* what one wants, where it is, and how to access it, 30 minutes is not long enough.

As a test of this BBS, I searched the 1993 statutes for "aquatic and plant and (management or control)", a standard Boolean search construction. I got 395 hits, including the statute chapter dealing with "dissolution of marriage". There was not enough time to load and look at even a small number of these laws to find out if any of them actually had anything to do with aquatic plants.

Searching the current bills part of the BBS, I found 22 hits for "aquatic and plant", including bill HB 1009, a bill to re-new the Aquatic Plant Control Trust Fund. I tried to download the bill before my 30 minutes were up, without success. Because of heavy use of this BBS, I was not able to log on again that day.

The On-Line Sunshine number is 904-488-1945. Set your communications software to 2400 or less, 8 bits, no parity, 1 stop bit. Anyone can log on for 30 minute calls, and if you can get through, you can call as many times as you like.

LAKES-L, Network on Lakes

This "list service" is "an international computer discussion place for lakes, where professionals, people who live on lakes and/or are concerned, talk about them and their watersheds." All related topics are discussed online and distributed as e-mail to all who subscribe to this free list service.

A recent discussion among several subscribers about the use of grass carp in northern lakes proved an interesting and enlightening diversion for others on the service, and showed that there still is significant confusion and debate regarding the use of grass carp for aquatic plant control.

LAKES-L is available by free subscription. To subscribe, send an email message to MAJORDOMO@BADGER.STATE.WI.US In the body of the message write SUBSCRIBE LAKES-L

To distribute a message to subscribers of the service, send it to LAKES-L@BADGER.STATE.WI.US

BEN, Botanical Electronic News

This new list service covers everything of a botanical nature.

BEN is managed by Dr. Adolf Ceska and is available by free subscription at ACESKA@FRENET.VICTORIA.BC.CA or ACESKA@RBML01.RBCM.GOV.BC.CA

WI-Lakes BBS

The Wisconsin Department of Natural Resources, Water Resources Management Bureau, maintains this BBS. Many kinds of Wisconsin-related information may be downloaded from this resource, from aquatic plant management brochures to three different newsletters. DNR biologists may also be contacted here.

To access the BBS and receive a list of free publications, email to LAKEEBB@DNRMA.DNR.STATE.WI.US To access the BBS via modem, dial 608-267-7551 and set your software to 9600 baud or less, 8 data, no parity, 1 stop bit. It operates 24 hours a day, everyday.

AquaNIC, Aquaculture Network Information Center

This is a "gateway to the world's electronic resources in aquaculture", maintained at the Purdue University and supported by the Cooperative Extension Service.

It is available via gopher, mosaic, telnet and modem. For modem, the phone number is 317-496-1440, 14,400 baud or less, 8 data, no parity, 1 stop bit; enter first and last name, then enter "connect thorplus.lib.purdue.edu", then login as "cwis". There is no password, so press return. The gopher address is: "gopher://thorplus.lib.purdue.edu:70//11/databases/AquaNIC"

For more information email Mark Einstein at MEINSTEI@HUB.ANSC.PURDUE.EDU or voice 317-494-4862.

IPMnet

This resource is formally known as the Global IPM Information Service, and, you guessed it, is about Integrated Pest Management information. It includes an online newsletter, IPMnet NEWS, edited by A.E. Deutsch.

To sign up, e-mail to DEUTSCHA@BCC.ORST.EDU

Plant Path On-Line

For plant pathologists, e-mail to APSNET@SCISOC.ORG

**FREE,
Florida Resources in Environmental Education**

For information, call 800-542-FREE between 8:30 and 5:30 EST.

**Ecosystem Management
and Environmental Education BBS**

This BBS is maintained by the Florida Department of Environmental Protection and is a free service to anyone "concerned about our environment". You will find educational text files, educational software, DEP Rules and Regs, online conferences and other online services.

To dial up the database, call 904-922-7108, and set your communications software to 8 data, no parity, 1 stop bit.

To contact the BBS, e-mail to DEPINFO@DEP.STATE.FL.US. The system operator (SYSOP) is Jim Lewis at 904-488-9334 voice.

Wetland Values Database

This database contains nearly 15,000 bibliographic records of "literature pertinent to wetland values and functions", intended to help US Fish & Wildlife Service's efforts to delineate wetlands.

To search this database, contact the Wetlands Values Database Administrator of the USFWS/National Wetlands Inventory, 9720 Executive Center Drive, Suite 101, St. Petersburg, FL 33702-2440, 813-893-3624.

Some Internet URLs

Users of the Internet, who have "graphical browsers" (such as NetScape, Internet-in-a-Box, and Chameleon) are able to directly access the graphical "home pages", databases and other information services of thousands of government agencies, universities and corporations. Graphical home pages make it much easier for most computer users to "navigate" through the myriad resources of the Internet, as compared to text-only "gopher" access.

To call graphical interfaces, users must have their "addresses". These are termed "URLs", for Universal Resource Locators. Listed below are URLs for some information suppliers that may be of interest to *AQUAPHYTE* readers:

US Army Corps, Waterways Experiment Station
<http://www.wes.army.mil>

University of Florida, IFAS
<http://gnv.ifas.ufl.edu>

Canadian IPM Information
<http://www.env.gov.bc.ca>

US Environmental Protection Agency
<http://www.epa.gov>

US Department of the Interior
<http://info.er.usgs.gov>

Library of Congress
<http://www.loc.gov>

National Science Foundation
<http://www.nsf.gov>

US Fish & Wildlife Service
<http://www.fws.gov>

US Wetlands inventory
<http://www.wi.fws.gov>

-V.R.

Botanical Pronunciations

According to Allen J. Coombes, author of *The Dictionary of Plant Names*, whatever the origin of a scientific name, Latin or Greek, it should be pronounced as if it were Latin, *except* where the name derives from personal or place names, in which case the name should be pronounced according to the original word, with a Latin pronunciation for any endings.

Coombes says these are the preferred pronunciations for some aquatic plants:

a-lis-ma lan-kee-o-lah-tum - *Alisma lanceolatum*
 boo-to-mus um-bel-ah-tus - *Butomus umbellatus*
 ka-lee-tri-kee - *Callitriche*
 ke-ra-to-fil-lum day-mer-sum - *Ceratophyllum demersum*
 e-keen-o-klo-a - *Echinochloa*
 iek-horn-ee-a kras-i-pays - *Eichhornia crassipes*
 hid-ril-la ver-ti-ki-lah-ta - *Hydrilla verticillata*
 i-pom-oy-a - *Ipomoea*
 la-ga-ro-see-fon - *Lagarosiphon*
 nas-tur-tee-um - *Nasturtium*
 ne-lum-bo loo-tee-a - *Nelumbo lutea*

new-far - *Nuphar*
 pen-i-say-tum - *Pennisetum*
 po-li-go-num - *Polygonum*
 po-ta-mo-gay-ton - *Potamogeton*
 spar-teen-a - *Spartina*
 tee-fa - *Typha*

To purchase: *Dictionary of Plant Names* by A.J. Coombes. 1985. Timber Press, 133 SW 2 AVE, Suite 450, Portland, Oregon 97204; 503/227-2878; 1-800-327-5680. ISBN 0-88192-023-1. 207 pp. \$10.95 + S/H.

FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since November, 1994.

The database has more than 40,000 items. To receive free bibliographies on specific plants and/or subjects, contact APIRS at the address shown on the mail label on page 16.

To obtain articles, contact your nearest state or university library.

Abernethy, V.J.; Sabbatini, M.R.; Murphy, K.J.

Response of *Elodea canadensis* and *Myriophyllum spicatum* to shade, cutting and competition in experimental culture: ecological implications.

9TH INTERNAT. SYMP. ON AQUATIC WEEDS, 12-16 SEPT. 1994, TRINITY COLLEGE, DUBLIN, IRELAND, EUROPEAN WEED RES. SOC., PP. 1., 1994.

Akcin, G.; Guldede, N.; Saltabas, O.
Zinc removal in strongly basic solutions by water hyacinth.

J. ENVIRON. SCI. HEALTH A28(8):1727-1735, 1993.

Andersen, F.O.; Olsen, K.R.

Nutrient cycling in shallow, oligotrophic Lake Kvie, Denmark.

HYDROBIOLOGIA 275/276:267-276, 1994.

Angerstein, M.B.; Lemke, D.E.

First records of the aquatic weed *Hygrophila polysperma* (Acanthaceae) from Texas.

SIDA 16(2):365-371, 1994.

Aoyama, I.; Nishizaki, H.

Uptake of nitrogen and phosphate and water purification by water hyacinth *Eichhornia crassipes* (Mart.) Solms.

WAT. SCI. TECH. 28(7):47-53, 1993.

Aweke, G.

The water hyacinth (*Eichhornia crassipes*) in Ethiopia.

BULL. SEANC. ACAD. R. SCI. OUTRE-MER MEDED. ZITT. K. ACAD. OVERZEESE WET. 39(3):399-404, 1994.

Bartgis, R.L.

The endangered sedge *Scirpus ancistrochaetus* and the flora of sinkhole ponds in Maryland and West Virginia.

CASTANEA 57(1):46-51, 1992.

Batzer, D.P.; Resh, V.H.

Wetland management strategies that enhance waterfowl habitats can also control mosquitoes.

J. AM. MOSQUITO CONTROL ASSOC. 8(2):117-125, 1992.

Bendix, M.; Tornbjerg, T.; Brix, H.

Internal gas transport in *Typha latifolia* L. and *Typha angustifolia* L. 1. Humidity-induced pressurization and convective throughflow.

AQUATIC BOTANY 49(2-3):75-89, 1994.

Best, E.P.H.

The impact of mechanical harvesting regimes on the aquatic and shore vegetation in water courses of agricultural areas of the Netherlands.

VEGETATIO 112(1):57-71, 1994.

Blossey, B.; Schroeder, D.; Hight, S.D.; Malecki, R.A.

Host specificity and environmental impact of the weevil *Hylobius transversovittatus*, a biological control agent of purple loosestrife (*Lythrum salicaria*).

WEED SCI. 42(1):128-133, 1994.

Brenner, M.; Whitmore, T.J.;

Flannery, M.S.; Binford, M.W.

Paleolimnological methods for defining target conditions in lake restoration: Florida case studies.

LAKE RESERVOIR MANAGE. 7(2):209-217, 1993.

Campeau, S.; Murkin, H.R.;

Titman, R.D.

Relative importance of algae and emergent plant litter to freshwater marsh invertebrates.

CAN. J. FISH. AQUAT. SCI. 51(3):681-692, 1994.

Casey, H.; Smith, S.M.

The effects of watercress growing on chalk headwater streams in Dorset and Hampshire.

ENVIRON. POLLUT. 85(2):217-228, 1994.

Chambers, J.M.; Wrigley, T.J.

McComb, A.J.

The potential use of wetlands to reduce phosphorus export from agricultural catchments.

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More On Balls

As an example of some of the anomalies found in the aquatic plant world, we pictured *Ruppia* balls on the back page of the spring 1994 issue of *AQUAPHYTE*. The photo was taken from a 1948 article by E.O. Essig, "The *Ruppia* balls of Little Borax Lake" (*Sci. Monthly* 66:467-471).

To our surprise, we received responses from around the world about aquatic plant balls. Olga Urbanc-Bercic from the

combined with a current parallel to the shore but perpendicular to the waves." The moss balls he describes are yet a third type, composed of living *Fontinalis antipyretica* and *Drepanocladus tenuinervis* yet formed in the same manner as false lake balls. Luther reviews the literature describing lake balls from Japan, Arctic Alaska and Patagonia. He also lists references on lake balls as far back as 1902.

In short, anomalies are not always as anomalous as they first appear. And, as Olga Urbanc-Bercic put it, "Nature again expresses its endless imagination and creativity."



Larch leaf balls from Slovenia.



Ruppia balls from New Zealand.

Institute of Biology in Slovenia wrote "What a coincidence! A month ago we found similar balls in our small but well known Lake Bled." Balls were round or oval, compact, from 4 to 16 cm in diameter, and composed of larch-tree (*Larix decidua*) leaves. They were found floating near the edge of the lake after heavy spring rains washed litterfall into the water body.

Then, P. Gerbeaux of Tour du Valat, Station Biologique in France sent a photo of *Ruppia megacarpa* balls collected in 1986 from Lake Ellesmere, New Zealand.

Later, while scanning for new citations to add to the *APIRS* collection, we encountered an article by David Ballantine, "Multi-species algal balls and potentially imprisoned fauna: an unusual benthic assemblage" (*Aquatic Botany* 48:167-174 (1994)). He reports that the "hollow algal balls were remarkable in that they often contained, and likely imprisoned, a variety of invertebrates..." The balls were collected from the Caribbean Sea in Venezuela.

Further searching in the *APIRS* database produced "Aquatic moss balls in southern Finland" by Hans Luther (*Ann. Bot. Fennici* 16:163-172 (1979)). Luther describes both "true lake balls" and "false lake balls". True lake balls, or aegagropiloids, are "formed by living algae growing radially in all direction as the balls are moved around by waves and currents". According to Luther, they are most frequently represented by *Cladophora aegagropila*. False lake balls are composed of dead plant material and formed "in general by waves in shallow water,

New Journal

Current Topics in Wetland Biogeochemistry is a new journal, edited by W.H. Patrick and J.A. Nyman. It is published by the Wetland Biogeochemistry Institute of Louisiana State University.

The journal was founded as a vehicle for "comprehensive, in-depth reviews" about the biological, geological and chemical processes that interact to determine the forms and functions of wetland systems.

Journal topics include elemental cycling, plant-soil interactions, chemical and biological behavior of toxic metals and organics, greenhouse gas emissions and climate change and the role of wetlands in water quality improvement.

The first volume of *CTWB* includes reviews on wetlands and nitrous oxide, denitrification, methane fluxes, paleoecology, and hydric soil formation.

Current Topics in Wetland Biogeochemistry will be published once a year, each summer. Individual subscriptions are US \$15.00/yr; library subscriptions are \$30.00/yr. Send check to Karen Gros, Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge, LA 70803-7511.

BOOKS/REPORTS

HERBIVOROUS FISHES, Culture and Use for Weed Management, by K. Opuszynski and J.V. Shireman. 1995. 223 pp.

(Order from CRC Press, Inc., 2000 Corporate Blvd., N.W., Boca Raton, FL 33431, 407/994-0555. In U.S., \$159.95 plus S/H.)

This is almost everything you ever wanted to know about freshwater herbivorous fishes, focusing on the Chinese grass carp, (*Ctenopharyngodon idella*), the silver carp (*Hypophthalmichthys molitrix*) and the bighead carp (*Hypophthalmichthys nobilis*).

It is a comprehensive review of the scientific literature on herbivorous fishes, from taxonomy, morphology and digestive mechanisms, to reproduction, development, feeding behavior and growth. The book includes a section on all aspects of culturing grass carp, and also includes sections on using grass carp for aquatic weed control, and on using phytoplanktivorous fishes for counteracting eutrophication. The book includes a reference list of almost 800 citations.

BIOLOGICAL AND HOST RANGE STUDIES WITH *BAGOUS AFFINIS*, AN INDIAN WEEVIL THAT DESTROYS HYDRILLA TUBERS, by G.R. Buckingham and C.A. Bennett, prepared for U.S. Army Corps of Engineers. 1994. 54 pp.

(Order from Reports and Distribution, U.S. Army Corps of Engineers, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, 601/634-2571. Technical Report A-94-8.)

This report consolidates information on the biology and host range studies of *Bagous affinis*, a tuber feeder on the noxious plant, *Hydrilla verticillata*. In feeding preference tests, newly emerged adults preferred stems over other plant parts, and older adults fed only on the stems.

The report states that cold-intolerant *B. affinis* could not establish in northern areas of the U.S., not even northern Florida. Furthermore: "Because of the lack of a seasonal dry period in most areas of the United States, establishment of field populations seems unlikely."

WETLANDS AND SHALLOW CONTINENTAL WATER BODIES, Volume 2. Case Studies, edited by B.C. Paten. 1994. 732 pp.

(Order from SPB Academic Publishing bv, POB 11188, 1001 GD Amsterdam, The Netherlands. US\$ 166.00.)

This volume follows four years after Volume 1. Natural and Human Relationships, in which wetland elements, processes, impacts and management are defined.

The present volume "consists of case studies in wetlands management and research drawn from around the world, offering insights into data collection methodologies, policy applications (or failures), and environmental modeling."

These two volumes represent a SCOPE (Scientific Committee on Problems of the Environment, International Council of Scientific Unions) study funded by the United Nations Environmental Program (UNEP), to survey the state of wetlands and wetland knowledge around the world, as well as inventorying human uses and abuses.

PROTECTION OF WATER RESOURCES AND AQUATIC ECOSYSTEMS, Water Series No. 1, by the Economic Commission for Europe (Geneva) for the United Nations. 1993. 50 pp.

(Order from United Nations Publications, Sales Section, 2 United Nations Plaza, Room DC2-853, New York, NY 10017. US \$12.00 plus S/H.)

This is a new series of publications on policies, strategies, guidelines, recommendations and technical studies on water problems, "intended to provide guidance to strengthen national and international measures to prevent, control and reduce the release of hazardous substances into the aquatic environment, to ensure conservation and, where necessary, restoration of ecosystems, to abate eutrophication and acidification, to ensure rational and ecologically sound water management, and to protect related ecosystems including the marine environment."

This first volume includes three documents by "the Working Party on Water Problems" which were "adopted by the Senior Advisors" to ECE Governments on Environmental and Water Problems.

The documents include Guidelines on the Ecosystem Approach in Water Man-

agement; Water-quality Criteria and Objectives; and Prevention and Control of Water Pollution from Fertilizers and Pesticides. Guidelines include, *inter alia*, "furthering all measures and behaviours to maintain and improve conditions and functions of aquatic ecosystems", and "promoting cooperation between countries bordering the same watercourses." This is the kind of material that fills this anonymous guide.

AQUATIC PLANTS FOR WATER TREATMENT AND RESOURCE RECOVERY, edited by K.R. Reddy and W.H. Smith. 1987. 1032 pp.

(Order from Magnolia Publishing, Inc., POB 536904, Orlando, FL 32853-6904. 407/898-2604.)

Using aquatic plants' abilities to process nutrients to solve problems caused by people is the subject of this book. The publisher has announced the re-printing of this collection of almost 90 papers.

AQUATIC PLANTS AND WETLAND WILDLIFE RESOURCES OF NIGERIA by E.O. Ita. 1994. 52 pp.

(Order from the Food and Agriculture Organization of the United Nations, Rome. CIFA Occasional Paper No. 21.)

In this report, the author (a researcher for the Nigerian National Institute for Freshwater Fisheries Research) presents a literature review about the aquatic resources of Nigeria.

Included here are several tables listing aquatic plant resources, and their zonation, productivity and traditional utilization.

The report includes aquatic plant management recommendations which take into account the reported benefits of aquatic plants as well as problems caused by their infestations.

CREATED AND NATURAL WETLANDS FOR CONTROLLING NON-POINT SOURCE POLLUTION, edited by R.K. Olson. 1993. 216 pp.

(Order from CRC Press, Inc. POB 6123, Ft. Lauderdale, FL 33310, 800/272-7737. \$54.95 plus S/H.)

This EPA-sponsored workshop proceedings includes 11 papers about the use of wetlands for rural nonpoint source pollution (NPS) control. The themes that emerge in the papers, according to the editor, are: "natural wetlands should not

be used as wastewater treatment systems"; "wetlands cannot be expected to compensate for insufficient use of BMPs"; social and economic issues having to do with wetland use will be difficult to resolve; and "knowledge of technical issues is uneven".

LIFE ON THE EDGE... Owning Waterfront Property, by M.D. Dresen and R.M. Korth. 1994. 109 pp.

(Order from UWEX-Lake Management Program, College of Natural Resources, University of Wisconsin, Stevens Point, WI 54481. \$3.00.)

This nicely laid-out and illustrated Cooperative Extension publication is a practical guide about what homeowners can do to protect and enhance their lakes. The book is in 22 chapters in 4 sections: Selecting Waterfront Property (including a checklist); Living with Waterfront Property; Aquatic Plants; and Law of the Land...and Waters.

At the end of each informative chapter is a listing of additional informative brochures and publications of the Wisconsin DNR and the UW Extension Service.

RESTORATION OF LAKE ECOSYSTEMS, A Holistic Approach, edited by M. Eiseltova. 1994. 182 pp.

(Order from Natural History Book Service Ltd., 2-3 Wills Road, Totnes, Devon TQ9 5XN, UK. IWRB Publication 32. Cost UK 18.00 pounds plus S/H.)

So you think you know how complex lake ecosystems are! In this "training handbook", you will be re-introduced to the concepts and knowledge that are important to consider while planning the restoration of lakes.

This manual was published by the International Waterfowl and Wetlands Research Bureau. It resulted from two training courses on the restoration of eutrophic lakes held in former Czechoslovakia (1992) and Estonia (1993). It is aimed at an "advanced" audience of ecologists, engineers and planners.

"Restoration" here means "the normalisation or considerable reduction of internal nutrient loading", and "holistic approach" means "considering all the processes in a catchment area". The goal is to address the "urgent need for re-creation of surface water bodies in the landscape".

Though this book deals with the holistic "laws" that govern lake and wetland functioning in northern latitudes, the laws still apply to shallow lakes in southern latitudes. Whether or not all of this "training manual" would apply to lake restoration in Florida, for example, it still fills a void: there is no other training manual that might apply to restoration of Florida lakes.

INFLUENCE OF HYDROLOGIC LOADING RATE ON PHOSPHORUS RETENTION AND ECOSYSTEM PRODUCTIVITY IN CREATED WETLANDS, by W.J. Mitsch and J.K. Cronk, prepared for U.S. Army Corps of Engineers. 1995. 98 pp.

(Order from Reports and Distribution, U.S. Army Corps of Engineers, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, 601/634-2571. Technical Report WRP-RE-6.)

This is the final report of a 5-year project to study the optimum amount of water that can be discharged into wetlands. Four 2- to 3-ha wetlands were constructed in Lake County, Illinois. Two were "low-flow wetlands" and two were "high-flow wetlands". All were measured for phosphorus, macrophytes, periphyton and water column productivity.

The researchers found that all four wetlands retained significant amounts of the incoming phosphorus.

PLANTS IN WETLANDS, Redington Field Guide to Biological Interactions, by C.B. Redington. 1994. 394 pp.

(Order from Patricia Ledlie-Bookseller, Inc., Natural Science Books, POB 90, Bean Road, Buckfield, ME 04220, 207/336-2778. \$28.95.)

Here is a recommended field guide to wetland plants like none we have seen before.

It is a fine work "written and designed to consider biological interactions between plants and the full range of animal groups in wetlands". Each plant treatment in this unique book includes (in addition to the usual plant identification material) many easy-to-understand "boxed" descriptions of various animal types and species that use the plant in many ways or are affected by its presence in the wetland. Included are discussions about the plant's interactions with mammals, other plants, birds, reptiles, amphibians, insects, spiders and

fish. "Community interactions" as well as human/economic uses are described.

More than 100 species of trees, shrubs and herbs (keystone plants) are included, and nearly 1,000 animals are specifically referred to.

Several other useful features are included in this handy spiral-bound book: a key to wetland communities and very personal but informative descriptions of each; a "need to know" section for each plant, and a solicitation for readers' own observations; a very simple method for determining wetland delineation; a glossary; a life check list of plants and animals; and an appendix about spiders. Finally, copies of field data forms for each wetland plant included in this guide are found in the last section.

The approximate range covered by the book is the eastern third of the United States.

According to the author, a "hypermedia version" of the guide will be available in the near future.

[NEW WETLANDS LAWS, from page 1]

undrained soils may be saline sands, such as found in tidal flats. Hydric soils include umbraqualls, sulfaquents, hydraquents, humaquepts, histosols (except folists), argiaquolls, or umbraqualls.

The fourth way to delineate a wetland under DEP rules requires the presence of one or more hydrologic indicators, and the presence of hydric soils. Hydrologic indicators include algal mats, aquatic mosses or liverworts, aquatic plants, aufwuchs, drift lines and rafted debris, elevated lichen lines, evidence of aquatic fauna, hydrologic data, morphological plant adaptations, secondary flow channels, sediment deposition, vegetated tussocks, or water marks.

To obtain this or other DEP rules and publications, contact the DEP Library, Florida Department of Environmental Protection, 2600 Blairstone Road, Room 441, Tallahassee, FL 32399-2400; 904/488-0890.

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AQUAPHYTE

This is the newsletter of the Center for Aquatic Plants and the Aquatic Plant Information Retrieval System (APIRS) of the University of Florida Institute of Food and Agricultural Sciences (IFAS). Support for the information system is provided by the Florida Department of Environmental Protection, the U.S. Army Corps of Engineers Waterways Experiment Station Aquatic Plant Control Research Program (APCRP), the St. Johns River Water Management District and UF/IFAS.

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 Karen Brown

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AQUAPHYTE is sent to 5,000 managers, researchers and agencies in 87 countries. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

Inclusion in *AQUAPHYTE* does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.



50% RECYCLED



From Wastewater to Water Gardens

This is the name of the latest videotape program to be produced by the Information Office of the UF/IFAS Center for Aquatic Plants.

At the Kanapaha Water Garden, reclaimed wastewater from the city of Gainesville, Florida is used to create an aesthetically pleasing aquatic plant-filled water garden in what used to be a cattle pasture. Simulating a "spring to sink" system common to north Florida, the reclaimed water flows from a "spring", through a series of waterfalls and ponds, to a slow moving "sink" that allows water to be either recirculated through the system or to filter down through the ground to recharge the Floridan aquifer.

This 10-minute program is suitable for students and general audiences. It may be borrowed free of charge from APIRS (address above), or it may be purchased for \$15.00 plus tax and S/H from IFAS Publications, IFAS Building 664, Gainesville, FL 32611-0001, 904/392-1764. Specify VT 1121.

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Center for Aquatic Plants

With Support From

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The U.S. Army Corps of Engineers, Waterways Experiment Station,

Aquatic Plant Control Research Program



UNIVERSITY OF
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Institute of Food and Agricultural Sciences

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<http://aquat1.ifas.ufl.edu/>

The Aquatic Plant Information Retrieval System (APIRS) is now online, available through the Internet as a World Wide Web site. This issue of **AQUAPHYTE** is about how to take advantage of this new dimension of APIRS' free information services.

We invite you to check in as soon as you can. And please let us know via e-mail what you think of what we're doing.

- See pages 4 and 5 for a facsimile and explanation of the APIRS home page.
- See page 2 for a list of Web sites of other "environmental" organizations.

Thanks to our Sponsors

The APIRS office is most grateful to receive major funding from two other agencies:



The Florida Department of Environmental Protection, Bureau of Aquatic Plant Management, Mr. Tom Brown, Bureau Chief.

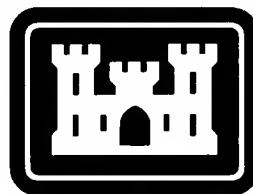
The DEP Bureau has provided base support for the aquatic plant database and the APIRS office since its inception more than 16 years ago, and has funded the production of many educational materials including instructional books and videotape programs.

Aquatic Plant Database Online

The APIRS aquatic plant database is now online, 24-hours a day. The 41,000-item database about freshwater macrophytes is the largest of its kind, and since 1981, it has been used by thousands of regulators, managers, teachers, students, advocacy groups and ordinary taxpayers. Heretofore, users had to write to us or call us and the APIRS office performed their database searches. Now, users may use the database by themselves, searching it in whatever ways they see fit. Use of the database remains free of charge.

To get to the database through the APIRS Web site, simply click on the word "database" in the first line listing on the home page (see page 4 of this issue of **AQUAPHYTE**). This will take you to a page that describes sign-on and sign-off procedures.

After following the sign-on procedure, you may search the database in myriad ways: search by keyword, author, date, citation, plant species, etc.



**US Army Corps
of Engineers**

The U.S. Army Corps of Engineers, Waterways Experiment Station, Aquatic Plant Control Research Program (APCRP), Mr. Lewis Decell, Director.

The Corps APCRP has provided special funding for various APIRS enhancements and video productions, and this past summer also funded the complete upgrade of the computers and software that were necessary to place the aquatic plant database online and to establish our aquatic plant Web site on the Internet.

Some Internet World Wide Web Addresses for Environmental Professionals

The following list was winnowed from hundreds of "environmental" Web sites we have come across and represent the ones that our readers are most likely to want to try.

AquaNIC - <http://thorplus.lib.purdue.edu/AquaNIC/>
Aquatic (Wetland) Plants - <http://aquat1.ifas.ufl.edu/>
Biodiversity and Biological Collections - <http://muse.bio.cornell.edu/>
Biodiversity, Ecology & the Environment - <http://golgi.harvard.edu/biopages/biodiversity.html>
Biodiversity & Ecosystems Network - <http://straylight.tamu.edu/bene/bene.html>
Biological Survey - <http://www.nfrcg.gov>
CERN Home page - <http://www.cern.ch/>
Chemistry - <http://www.chem.ucla.edu/chempointers.html>
Chemistry Home Page - <http://server.chem.ufl.edu/chem.links.html>
Chironomids - <http://www.uia.ac.be/u/intpanis/index.html>
Collection of Botany Related URL's - <http://www.helsinki.fi/~rlampine/botany.html>
Earth Sciences - <http://www-vl-es.geo.ucalgary.ca/VL/html/es-resources.html>
Ecological Society of America - http://www.sdsc.edu/1/SDSC/Research/Comp_Bio/ESA/ESA.html
Ecology - <http://biomserv.univ-lyon1.fr/Ecology-WWW.html>
EcoWeb, University of Virginia - <http://ecosys.drdr.virginia.edu:80/EcoWeb.html>
Energy - <http://solstice.crest.org/online/virtual-library/VLib-energy.html>
Entomology - <http://www.colostate.edu/Depts/Entomology/WWWVL-Entomology.html>
EPA - <http://www.epa.gov>
Environment - <http://ecosys.drdr.virginia.edu/Envirlists.html>
Environmental Education Network - <http://envirolink.org/enviroed/>
Environmental Law - <http://www.law.indiana.edu/law/intenvlaw.html>
Environmental Sites on the Internet - <http://www.lib.kth.se/lg.html>
Field Museum of Natural History - <http://www.bvis.uic.edu/museum/>
Fish and other aquatic animals - <http://www.actwin.com/WWWVL-Fish.html>
Florida Wildflowers - <http://www-wane-leon.scri.fsu.edu/~mikems/>
Forestry - <http://www.metla.fi/info/vlib/Forestry.html>
Global Change Master Directory, NASA - <http://gcmd.gsfc.nasa.gov/>
Great Lakes Program - <http://ncgia.geog.buffalo.edu/GLP/GLPhome.html>
Illinois Natural History Survey - <http://denr1.igis.uiuc.edu:70/>
Information Center for the Environment - <http://ice.ucdavis.edu:80/>
Landscape Architecture - <http://www.clr.toronto.edu/VIRTUALLIB/larch.html>
Man and the Biosphere - http://ice.ucdavis.edu:80/MAB/MAB_main_page.html
National Biological Service - <http://www.its.nbs.gov/nbs/>
National Wildlife Refuge System - <http://bluegoose.arw.r9.fws.gov/NWRSFiles/NWRSIndex.html>
Natural History Book Service - <http://www.nhbs.co.uk>
Natural Resources Research Info Pages - <http://sfbbox.vt.edu:10021/Y/yfleung/nrrips.html>
Planet Earth - <http://white.nosc.mil/info.html>
Plant Biology - <http://golgi.harvard.edu/biopages/botany.html>
PLANTS Database, Natural Resources Conservation Service - <http://trident.ftc.nrcs.usda.gov/npdc/>
Remote Sensing and GIS - <http://wwwrsl.forestry.umn.edu:10000/>
Smithsonian Natural History home page - <http://nmnhwww.si.edu/nmnhweb.html>
Software, Biological - <http://www.gdb.org/Dan/softsearch/softsearch.html>
US Fish and Wildlife Reference Database - <http://www.fws.gov/htdocs/fwrefser.html>
US Geological Survey, Online data - <http://www.usgs.gov/data/index.html>
US Government Information Sources - http://iridium.nttc.edu/gov_res.html
US Long-Term Ecological Research Network - <http://lternet.edu/>
Water Lily Society - <http://h20lily.rain.com>
WaterWeb - <http://www.waterweb.com>
Whales - <http://www.physics.helsinki.fi/whale/>
WWW Sites of Interest to Botanists - <http://meena.cc.uregina.ca/~liushus/bio/botany.html>

A T T H E C E N T E R

A New Director

Dr. Randall Stocker is the new director of the UF/IFAS Center for Aquatic Plants. Stocker formerly was Manager of the Planning and Technical Services Department of Imperial Irrigation District (California), the largest irrigation district in the western hemisphere, having use rights to 20% of the flow of the Colorado River. In a place having an average annual rainfall of only 3.5 inches, that water is sometimes contentiously desired by various parties. For fourteen years, Stocker helped manage and share the water among the District's many constituents, learning the finer points of diplomacy and method along the way. As for aquatic plants, his main problems had to do with hydrilla and algae in flowing water canals, ponds and reservoirs, and habitat conservation plans for endangered species.

Coming from a desert having only 3 inches of rain a year to a place of semi-tropical swamps where it rains nearly 60 inches a year is as dramatic a change as any a water manager would likely experience. But Stocker appears unperturbed: he's as "excited to be a participant in the on-going struggle to provide management tools to resource managers" here as he was there. And it's not as though he knows nothing about Florida's ecosystems--he conducted melaleuca control research on Lake Okeechobee for several years when he worked for the U.S. Army Corps of Engineers.

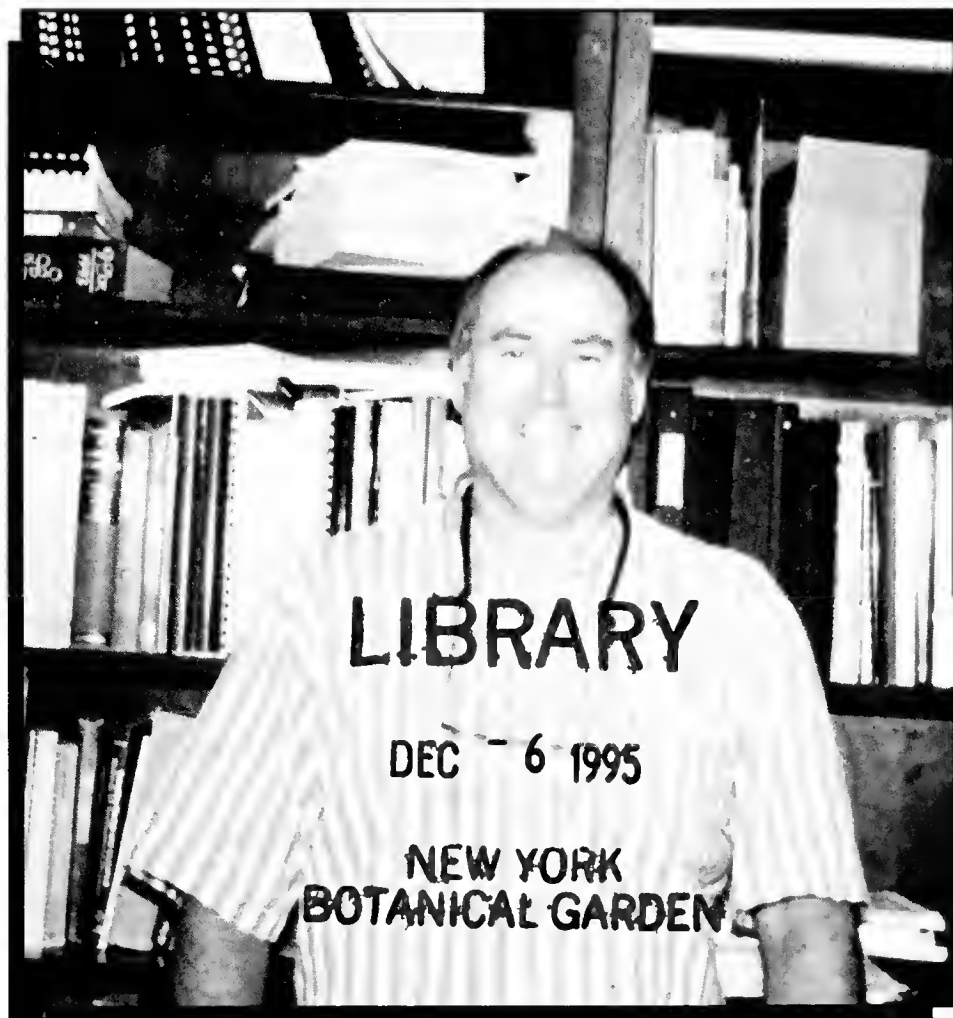
Stocker earned his PhD in plant ecology from Washington State University. Later, while teaching there, he met his future wife, Shelley, a student in an advanced ecology class. Eventually they married, and have two daughters, college-going Heather, and Shevy, a high school senior. Shelley currently is an elementary science and math teacher.

Stocker is an enthusiastic sailor; his 26-foot sloop is scheduled to visit lake and ocean waters throughout the state. He and Shelley say they are pleased to be in a university community again, and are "reawakening" to the joys of theatre and music that are so abundant in Gainesville.

Aquatic Plant Identification Deck

A 3" X 4" card deck of color photographs of 67 aquatic and wetland plant species, suitable for in-the-field reference. The cards are alphabetized with two tables of contents, by scientific name and by common name. Each card has plant identification information on the back. The cards are laminated for water resistance and bound with a screw and fastener.

The ID deck (IFAS Catalog No. SM-50) is available from the IFAS Publications Office, IFAS Building 664, University of Florida, Gainesville, FL, 32611-0001, (904) 392-1764. Price is \$8.00 per deck plus S/H and tax. Call for details. Checks or purchase orders are accepted.



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Dr. Randall Stocker, Director



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Welcome to the Center for Aquatic Plants and to APIRS, the Aquatic Plant Information Retrieval System. We provide a variety of free and for-sale products and services.

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More information is yours for the asking

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Here's where we tell you that our Web site is optimized to be accessed by your **Netscape browser**. However, other browsers such as Mosaic, Internet-in-a-Box and Chameleon also give very good results..

Click here to get to the 41,000+ citations of the **aquatic plant database**. Be sure to read the on-screen instructions *before* beginning your database session.

Before long, this **newsletter** will be online as well. You'll be able to read it on-screen, or download it to paper. This feature is likely to develop into an interactive aquatic plant forum as well.

Here is where you can view and/or download more than 60 **high resolution photographs** of aquatic (wetland) plants which will look pretty good on your 640X480X256 screen (or fantastic on your 800X600X32K screen). If you need photos for print publication, we can help you with that.

APIRS has produced about 25 **videotape programs** for various audiences, all having one thing or another to do with aquatic plants. Videos may be purchased or borrowed. Look here for descriptions and ordering information.

An adequate number of you have already expressed interest in purchasing a set of **aquatic plant photograph CDs**, as described in the last issue of **AQUAPHYTE** (Spring, 1995). We're working on them and will let you know.

We would like to re-print the **Freshwater Plants poster** that has been so popular with teachers and libraries. If you want to order a copy, or if you may be interested in paying for its re-printing, click here.

Line drawings often are better to look at for identification purposes than are photographs. Here is a collection of 60 aquatic plant line drawings for online viewing. If you need publication-quality drawings for books or newsletters, let us know.

Here is where you can find out **what we look like** and where we get our mail.

Over time, the **APIRS** office will develop this branch of our Web site into a "short course" about aquatic and wetland plants. This section of our Web site will resemble and act like an **interactive instructional CD** about aquatic and wetland plants, but will be better than a CD in that it will be constantly updated and added to.

Here's something new from the **APIRS** office: a **handy deck of ID cards** featuring color photographs of aquatic plants. See page 3 of this newsletter for more information.

Florida's two **aquatic plant Extension Specialists** can be contacted here. They get paid to answer your questions.

Links are jumping off points to other sites of interest. Click on their names and you'll go right to them, automatically. Just like in *Star Trek*.

The **logos** and links for the U.S. Army Corps of Engineers, the Florida Department of Environmental Protection and the St. John's River Water Management District are here.

FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since March, 1995.

The database has more than 41,000 items. To receive free bibliographies on specific plants and/or subjects, contact APIRS at the address shown on the mail label on page 12.

To obtain articles, contact your nearest state or university library.

Anderson, M.G.

Interactions between *Lythrum salicaria* and native organisms: a critical review.
ENVIRON. MANAGE. 19(2):225-231, 1995.

Auble, G.T.; Friedman, J.M.; Scott, M.L.

Relating riparian vegetation to present and future streamflows.
ECOL. APPL. 4(3):544-554, 1994.

Baillie, P.W.

Renovation of food-processing wastewater by a riparian wetland.
ENVIRON. MANAGE. 19(1):115-126, 1995.

Barko, J.W.; Chambers, P.A.

Perspectives on submersed macrophyte invasions and declines.
LAKE RESERVOIR MANAGE. 10(1):1-3, 1994.

Barlocher, F.; Newell S.Y.

Phenolics and proteins affecting palatability of *Spartina* leaves to the gastropod *Littoraria irrorata*.
MARINE ECOL. 15(1):65-75, 1994.

Barthlott, W.; Riede, K.; Wolter, M.

Mimicry and ultrastructural analogy between the semi-aquatic grasshopper *Paulinia acuminata* (Orthoptera: Pauliniidae) and its foodplant, the water-fern *Salvinia auriculata* (Filicatae: Salviniaceae).
AMAZONIANA 13(1-2):47-58, 1994.

Bird, K.T.; Jewett-Smith, J.; Fonseca, M.S.

Use of in vitro propagated *Ruppia maritima* for seagrass meadow restoration.
J. COASTAL RES. 10(3):732-737, 1994.

Bjork, S.

Treatment of overgrown shallow lakes - Macrophyte control: Lake Hornborga, Sweden.

IN: RESTORATION OF LAKE ECOSYSTEMS - A HOLISTIC APPROACH, M. EISELTOVA, ED., IWRB PUBL. 32 INTERNAT. WATERFOWL WETLANDS RES. BUR., GLOUCESTER, UK, PP.154-168, 1994.

Blom, C.W.P.M.; Voeselek, L.A.C.J.; Banga, M.; Engelaar, W.M.H.G.; et al

Physiological ecology of riverside species: adaptive response of plants to submergence.
ANNALS BOT. 74(3):253-263, 1994.

Bornette, G.; Amoros, C.; Castella, C.; Beffy, J.L.

Succession and fluctuation in the aquatic vegetation of two former Rhone River channels.
VEGETATIO 110(2):171-184, 1994.

Bratoeff, E.A.; Perez-Amador, M.C.

Phytochemical study of *Typha dominicensis* Pers. (Typhaceae).
PHYTON 55:71-75, 1994.

Bronmark, C.

Effects of tench and perch on interactions in a freshwater, benthic food chain.
ECOLOGY 75(6):1818-1828, 1994.

Bubier, J.L.; Moore, T.R.

An ecological perspective on methane emissions from northern wetlands.
TRENDS IN ECOL. & EVOLUTION 9(12):460-464, 1994.

Buckingham, G.R.; Bennett, C.A.

Biological and host range studies with *Bagous affinis*, an Indian weevil that destroys *Hydrilla* tubers.
TECHN. REPT. A-94-8, U.S. ARMY CORPS ENGINEERS, WATERWAYS EXPERIMENT STATION, AQUATIC PLANT CONTROL RES. PROG., VICKSBURG, MS, 54 PP., 1994.

Catarino, L.M.F.

Ecologia das infestantes aquáticas em canais de rega e utilização da carpa herbívora em protecção integrada.
PH.D. DISSERTATION, UNIVERSIDADE TECNICA DE LISBOA, LISBOA, PORTUGAL, 128 PP., 1995. (IN PORTUGUESE; ENGLISH SUMMARY)

Catling, P.M.; Spicer, K.W.;

Biernacki, M.; Lovett Doust, J.
The biology of Canadian weeds. 103. *Vallisneria spiralis* Michx.
CAN. J. PLANT SCI. 74(4):883-897, 1994.

Chen, D.X.; Coughenour, M.B.; Eberts, D.; Thullen, J.S.

Interactive effects of CO₂ enrichment and temperature on the growth of dioecious *Hydrilla verticillata*.
ENVIRON. EXPER. BOT. 34(4):345-353, 1994.

Clark, W.R.

Habitat selection by muskrats in experimental marshes undergoing succession.
CAN. J. ZOOLOGY 72(4):675-680, 1994.

Clary, W.P.

Vegetation and soil responses to grazing simulation on riparian meadows.
J. RANGE MANAGE. 48(1):18-25, 1995.

Coates, M.; Ferris, J.

The radiatively driven natural convection beneath a floating plant layer.
LIMNOL. OCEANOGR. 39(5):1186-1194, 1994.

Colle, D.E.; Shireman, J.V.

Use of grass carp in two Florida Lakes.
IN: PROC. OF THE GRASS CARP SYMP., 7-9 MAR. 1994, CTR. AQUATIC PLANTS, IFAS, UNIV. FL., GAINESVILLE, U.S. ARMY CORPS ENGINEERS, WATERWAYS EXPERIMENT STATION, VICKSBURG, MS, PP.111-120, 1994.

Conover, M.R.; Kania, G.S.

Impact of interspecific aggression and herbivory by mute swans on native waterfowl and aquatic vegetation in New England.
THE AUK 111(3):744-748, 1994.

Dads, D.K.; Kumar, S.; Singh, A.K.; Prasad, U.S.

Sucrose mobilisation in maturing seeds of water chestnut (*Trapa bispinosa* Roxb.) and Litchi (*Litchi chinensis* Sonn.).
J. FOOD SCI. TECHNOL. 30(3):199-201, 1993.

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Downstream effects of a new hydro-power impoundment on macrophyte, macroinvertebrate, and fish communities.
REGULATED RIVERS 9(4):253-261, 1994.

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Ecology of the salt marshes.
HYDROBIOLOGIA 282/283:299-301, 1994.

Denny, P.; Bailey, R.; Tukahirwa, E.; Mafabi, P.

Heavy metal contamination of Lake George (Uganda) and its wetlands.
HYDROBIOLOGIA 197(3):229-239, 1995.

Ding, X.; Jiang, J.; Wang, Y. Wang, W.; Ru, B.

Bioconcentration of cadmium in water hyacinth in relation to thiol group content.

ENVIRON. POLLUT. 84(1):93-96, 1994.

Doledec, S.; Statzner, B.

Theoretical habitat templates, species traits, and species richness: 548 plant and animal species in the upper Rhone River and its floodplain.

FRESHWATER BIOL. 31(3):523-538, 1994.

Do Prado, A.L.; Heckman, C.W.; Martins, F.R.

The seasonal succession of biotic communities in wetlands of the tropical wet-and-dry climatic zone: II. The aquatic macrophyte vegetation in the Pantanal of Mato Grosso, Brazil.

INT. REVUE GES HYDROBIOL. 79(4):569-589, 1994.

Duarte, C.M.; Planas, D.; Penuelas, J.

Macrophytes, taking control of an ancestral home.

IN: LIMNOLOGY NOW: A PARADIGM OF PLANETARY PROBLEMS, R. MARGALEF, ED., ELSEVIER SCI. B.V., PP.59-79, 1994.

Dushenko, W.T.; Bright, D.A.; Reimer, K.J.

Arsenic bioaccumulation and toxicity in aquatic macrophytes exposed to gold-mine effluent: relationships with environmental partitioning, metal uptake and nutrients.

AQUATIC BOT. 50(2):141-158, 1995.

Eckert, C.G.; Barnett, S.C.H.

Inbreeding depression in partially self-fertilizing *Decodon verticillatus* (Lythraceae): population-genetic and experimental analyses.

EVOLUTION 48(4):953-964, 1994.

Edwards, E.S.; Roux, S.J.

Limited period graviresponsiveness in germinating spores of *Ceratopteris richardii*.

PLANTA 195(1):150-152, 1994.

Fairchild, J.F.; LaPoint, T.W.; Schwartz, T.R.

Effects of an herbicide and insecticide mixture in aquatic mesocosms.

ARCH. ENVIRON. CONTAM. TOXICOL. 27(4):527-533, 1994.

Furness, C.A.

The pollen morphology of *Hygrophila* and *Brillantaisia* (Acanthaceae: Ruellieae).

ACTA BOT. GALLICA 141(2):267-278, 1994.

Gaudet, C.L.; Keddy, P.A.

Competitive performance and species distribution in shoreline plant communities: a comparative approach.

ECOLOGY 76(1):280-291, 1995.

Gerber, D.T.; Les, D.H.

Comparison of leaf morphology among submersed species of *Myriophyllum* (Haloragaceae) from different habitats and geographical distributions.

Am. J. Bot. 81(8):973-979, 1994.

Godfrey, K.E.; Anderson, L.W.J.

Feeding by *Bagous affinis* (coleoptera: Curculionidae) inhibits germination of *Hydrilla* tubers.

FL. ENTOMOL. 77(4):480-488, 1994.

Greenway, M.

Litter accession and accumulation in a *Melaleuca quiquenervia* (Cav.) S.T. Blake wetland in Southeastern Queensland.

AUST. J. MAR. FRESHWATER RES. 45(8):1509-1519, 1994.

Habeck, D.H.; Thompson, C.R.

Host specificity and biology of *Spodoptera pectinicornis* (Lepidoptera: Noctuidae), a biological control agent of waterlettuce (*Pistia stratiotes*).

BIOL. CONTROL 4(3):263-268, 1994.

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Distribution of unusual polyamines in aquatic plants and gramineous seeds.

CAN. J. BOT. 72(8):1114-1120, 1994.

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Acute toxicity and hazard assessment of rodeo, X-77 spreader, and Chem-trol to aquatic invertebrates.

ARCH. ENVIRON. CONTAM. TOXICOL. 27(3):392-399, 1994.

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CAN. J. FISH. AQUAT. SCI. 50(9):1870-1878, 1993.

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Myriophyllum spicatum pumps essential and nonessential trace elements from sediments to epiphytes.

CAN. J. FISH. AQUAT. SCI. 51(8):1769-1773, 1994.

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Ludwigia peruviana (Onagraceae) in the botany wetlands near Sydney, Australia.

AUST. J. MAR. FRESHWATER RES. 45(8):1481-1490, 1994.

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Effects of diet on rate of body mass gain by wintering canvasbacks.

J. WILDL. MANAGE. 59(1):31-39, 1995.

Khan, H.; Brush, G.S.

Nutrient and metal accumulation in a freshwater tidal marsh.

ESTUARIES 17(2):345-360, 1994.

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Fungi on *Juncus roemerianus*. 1. *Trichocladium medullare* sp. Nov.

MYCOTAXON 53:349-353, 1995.

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Acquisition of carbon in *Elodea canadensis* Michx.

J. PLANT PHYSIOL. 145(1-2):50-56, 1995.

Kraus, W.; King, J.J.

The ecological status of Lough Corrib, Ireland, as indicated by physiographic factors, water chemistry, and macrophytic flora.

VEGETATIO 110(2):149-161, 1994.

Linder, G.; Hazelwood, R.;

Palawski, D.; Bollman, M.; et al

Ecological assessment for the wetlands at Milltown Reservoir, Missoula, Montana: characterization of emergent and upland habitats.

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Response of black terns (*Chlidonias niger*) to glyphosate-induced habitat alterations on wetlands.

COLONIAL WATERBIRDS 17(2):160-167, 1994.

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American wildcelery, *Vallisneria spiralis*, as a biomonitor of organic contaminants in aquatic ecosystems.

J. GREAT LAKES RES. 20(2):333-354, 1994.

Madsen, T.V.; Sand-Jensen, K.

The interactive effects of light and inorganic carbon on aquatic plant growth.

PLANT CELL ENVIRON. 17(8):955-962, 1994.

Mallison, C.T.; Hestand, R.S.; Thompson, B.Z.

Removal of triploid grass carp using fish management bait (FMB).

IN: PROC. OF THE GRASS CARP SYMP., 7-9 MAR. 1994, CTR. AQUATIC PLANTS, IFAS, UNIV. FL., GAINESVILLE, U.S. ARMY CORPS ENGINEERS, WATERWAYS EXPERIMENT STATION, VICKSBURG, MS, PP. 65-71, 1994.

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Phragmites australis (*P. communis*): threats, management, and monitoring.
NATURAL AREAS J. 14(4):285-294, 1994.

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The potential for control of the soft rush (*Juncus effusus*) in the grass pasture by grazing goats.
GRASS FORAGE SCI. 48(4):395-409.

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Distribution of heavy metals in higher aquatic plants of the Uglich Reservoir.
RUSSIAN J. ECOL. 25(1):12-16, 1994.

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Boll weevil antifeedants from *Eleocharis dulcis* Trin.
J. AGRIC. FOOD CHEM. 42(7):1561-1562, 1994.

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Biology of tropical soda apple (*Solanum viarum*) an introduced weed in Florida.
WEED TECHNOL. 8(3):465-469, 1994.

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Freshwater and wetland plant communities of Loch Lomond.
HYDROBIOLOGIA 290(1-3):63-74, 1994.

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Toxic effects of 2,4-D herbicide on fish.
J. ENVIRON. SCI. HEALTH B29(2):265-279, 1994.

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Effects of cutting on the growth and photosynthesis of *Egeria densa* (Planchon) Caspary.
IN: ANNUAL REPT. OF FRESHWATER ECOLOGY AND BIOTECHNOLOGY LAB. (FEBL), BEIJING, CHINA, PP. 41-48, 1994.

Nip, W.K.; Whitaker, C.S.; Vargo, D.
Application of taro flour in cookie formulations.
INTERNAT. J. FOOD SCI. TECHNOL. 29(4):463-468, 1994.

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Duckweed culture for wastewater renovation and biomass production.
AGRIC. WATER MANAGE. 26(1-2):27-40, 1994.

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A bioassay for determining simazine in water using flowering plants (*Ceratophyllum oryzetorum*, *Ranunculus trichophyllus*, and *Alisma plantago-aquatica*).
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Inhibition of *Salvinia* (*Salvinia molesta* Mitchell) by *Parthenium* (*Parthenium hysterophorus* L.). I. Effect of leaf residue and alleochemicals.
J. CHEM. ECOL. 20(12):3111-3122, 1994.

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The toxicity of diquat, endothall, and fluridone to the early life stages of fish.
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Short-term response of riparian vegetation to 4 grazing treatments.
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Primary succession of aquatic macrophytes in experimental ditches in relation to nutrient input.
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Life history and distribution of the Australian weevil *Oxyops vitiosa* (Coleoptera: Curculionidae), a potential biological control agent for *Melaleuca quinquenervia* (Myrtaceae).
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Experimental study of inorganic and methylmercury bioaccumulation by four species of freshwater rooted macrophytes from water and sediment contamination sources.
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Comparisons of cove rotenone and electrofishing catch-depletion estimates to determine abundance of age-0 largemouth bass in unvegetated and vegetated areas.
J. FRESHWATER ECOL. 9(1):19-27, 1994.

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Propagation of *Potamogeton* and *Sagittaria* from seeds.
TRANS. N. AM. WILDL. CONF. 4:351-358, 1939.

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Allozymic uniformity in *Iris lacustris* (Dwarf Lake Iris) in Wisconsin.
CAN. J. BOT. 72(11):1720-1722, 1994.

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Treatment of chromium and nickel in wastewater by using aquatic plants.
WATER RES. 28(7):1631-1638, 1994.

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Oxidation of the root zone by aquatic plants growing in gravel-nutrient solution culture.
J. ENVIRON. QUAL. 23(5):907-913, 1994.

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Anaerobic conditions strongly promote extension by stems of overwintering tubers of *Potamogeton pectinatus*.
J. EXPER. BOT. 45(278):1309-1318, 1994.

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Biosystematic studies on the genus *Isoetes* in Japan variations of the somatic chromosomes numbers.
J. PLANT RES. 197:289-297, 1994.

Tanner, C.C.; Clayton, J.S.; Upsdell, M.P.
Effect of loading rate and planning on treatment of dairy farm wastewaters in constructed wetlands - I. Removal of oxygen demand, suspended solids and faecal coliforms.
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Teller, S.; Appenroth, K.J.
The appearance of glutamine synthetase in turions of *Spirodela polyrrhiza* (L.)

Schleiden as regulated by blue and red light, nitrate, and ammonium.

J. EXPER. BOT. 45(278):1219-1226, 1994.

Uheda, E.; Kitoch, S.; Dohmaru, T.; Shiomi, N.

Isolation and analysis of gas bubbles in the cavities of *Azolla* leaves.

PHYSIOL. PLANT. 93(1):1-4, 1995.

Valdovinos-Ponce, G.; Ponce-Salazar, R.M.; Marquez-Guzman, J.

Histoquímica del desarrollo de la testa de *Ipomoea aquatica* Forsk (Convolvulaceae) en relación con la permeabilidad al agua.

PHYTON 55:107-114 (IN SPANISH), 1994.

Van, T.K.; Center, T.D.

Effect of paclobutrazol and water hyacinth weevil (*Neochetina eichhorniae*) on plant growth and leaf dynamics of water hyacinth (*Eichhornia crassipes*).

WEED SCI. 42(4):665-672, 1994.

Van Thielen, R.V.; Ajuonu, O.; Schade, V.; Neuenschwander, P.; et al

Importation, releases, and establishment of *Neochetina* spp. (Col.: Curculionidae) for the biological control of water hyacinth, *Eichhornia crassipes* (Lil.: Pontederiaceae), in Benin, West Africa.

ENTOMOPHAGA 39(2):179-188, 1994.

Vaughan, D.; Cheshire, M.V.; Ord, B.G.

A simple technique for producing ¹³C or ¹⁴C-labeled fronds of *Lemna gibba* and their use in soil incubation investigations.

PLANT SOIL 160(2):185-191, 1994.

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Toxicity of *Melaleuca* oil and related essential oils applied topically on dogs and cats.

VET. HUMAN TOXICOL. 36(2):139-142, 1994.

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Seasonal changes of polyamines in habitat adaptation of different ecotypes of reed plants.

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Translocation, remineralization, and turnover of nitrogen in the roots and rhizomes of *Spartina alterniflora* (Gramineae).

AM. J. BOT. 81(10):1225-1234, 1994.

Computer Software From the U.S. Army Corps of Engineers

Herbivores of Exotic Aquatic Plants

by M.J. Grodowitz, W.A. Johnson, T.D. Center, G. Buckingham, and A.F. Cofrancesco, Jr.; with photographs by W. Durden

For IBM 386 or better, running Windows 3.1, hard drive with 19 MB free space, video mode 640X480X256 color, install from 13 IBM 1.44 MB discs

Since 1959, twelve insect agents for the biological control of the exotic aquatic plants, alligatorweed, water hyacinth, water lettuce and hydrilla, have been investigated and released, and are now established in eleven US states. Many native insects are also at work feeding upon and damaging these problem plants. As biocontrol experts note, "With the increasing diversity of insect biocontrol agents, identification, recognition and the use of these agents becomes increasingly complicated."

Aquatic plant managers need to be able to identify feeding insects so they can understand and document how much biocontrol is being exerted, and so they can make aquatic plant management plans accordingly. This software is specifically for aquatic plant managers, and makes it possible for non-experts to identify any of 28 insects (fourteen native insects and fourteen exotic insects are treated) that may be feeding on the four major exotic weeds of special concern.

Herbivores of Exotic Aquatic Plants is actually two computer programs: *ID Expert-Insect* and *ID Expert-Damage*. One enables the user to identify the feeding insect they see before them; the other enables the user to identify the insect according to the feeding damage that is evident on the plants. Both program parts are easily mastered--the more matching characteristics the user is able to choose from the program's characteristics list, the more likely the list of possible insects is reduced from 28 down to the one in question.

From the list of possible insects, the user may choose to see photographs of larval and adult stages, or may choose to read about an insect's history, plant hosts, scientific description, collection techniques, feeding damage and effects on plants. For example, according to the program the feeding damage of *Amynothrips andersoni*, the alligatorweed thrips, resembles damage caused by the herbicide 2,4-D (brown curling leaves, highly folded).

Installation of the program is simple: insert disc 1, "Run" from "File" in Windows 3.1, and wait to be prompted for each of the 13 installation discs. When loaded (about 20 minutes), a new "program window" appears having icons for each of the two program parts "Insect" and "Damage". The program design and layout is very professional looking and colorful. However, some of the photographs as presented on a 640X480X256 screen leave something to be desired. For example the pictures of the mites look like tiny black discs and the picture of the adult thrips looks like an insect's shadow. Perhaps the photos should be made larger, and the required video mode should be higher so that images would have higher resolutions and the insects and their parts would be more identifiable.

For ordering information, contact Ms. Christine M. Bauer, US Army Corps of Engineers, Jacksonville District, POB 4970, Jacksonville, FL 32232-0019, 904/232-2074.

Books/Reports

AN ASSESSMENT OF INVASIVE NON-INDIGENOUS SPECIES IN FLORIDA'S PUBLIC LANDS, edited by D.C. Schmitz and T.C. Brown. 1994. 303 pp.

(Order from Bureau of Aquatic Plant Management, Florida Department of Environmental Protection, 2051 East Dirac Drive, Tallahassee, FL 32310, 904/488-5631. Technical Report TSS-94-100.)

This report consists of chapters and essays by some 60 authors. They discuss the ecological consequences and histories of non-native introductions; impacts of non-indigenous species on public lands and their economic costs; biocontrol and restoration; governmental approaches; and conservation priorities.

They describe a number of exotic species in Florida, from the "Australian pine" to hydrilla to the aggressive brown tree snake (from the Solomon Islands), which "could devastate Florida's environment and tourism industry."

The editors state that "non-indigenous species invasions now threaten Florida's environment at all levels."

THE IMPORTANCE OF AQUATIC-TERRESTRIAL ECOTONES FOR FRESHWATER FISH, edited by F. Schiemer, M. Zalewski and J.E. Thorpe. 1995. 264 pp.

(Order from Kluwer Academic Publishers Group, 101 Philip Drive, Norwell, MA 02061. US\$211.00.)

"Ecotones are interface zones between different ecosystems." According to the editors, ecotones perform important functions, they may be almost any size and shape, and may themselves be comprised of smaller ecotones. They may exist for only days or for decades, and they may evolve into new ecotones. Why aren't ecotones considered ecosystems? Are attempts to define ecotones mere sophism? Maybe not.

This collection of 25 papers describes the roles of ecotones in lakes and reservoirs, in streams, large rivers, and floodplains, especially as ecotones serve fish populations as feeding, spawning and nursery areas.

PLANTAS ACUATICAS VASCULARES DE VENEZUELA, by J. Velasquez. 1994. 992 pp. (In Spanish.)

(Order from J. Velasquez, Consejo de Desarrollo Científico y Humanístico, Universidad Central de Venezuela.)

This very thorough book is by Profesor Justiniano Velasquez ("hombre modesto" according to the prolog), a botany professor at the Universidad Central de Venezuela.

It is a keyed taxonomy of several hundred aquatic plants of Venezuela, with distribution maps of occurrences in that country. Most of the plants are illustrated by very good line drawings, and 90 are illustrated by color photographs as well. In addition, the fruits of some plants are represented by b/w photographs. The quality of the printing is not very good, but is adequate.

PLANTAS INFESTANTES E NOCI-VAS-TOMO III, PLANTAS DICO-TILEDONEAS POR ORDEM ALFABETICA DE FAMILIAS: GERANIACEAE A VERBENACEAE, by K.G. Kissmann and D. Groth. 1995. 683 pp. (In Portuguese.)

(For ordering information, contact Dr. Kurt Kissmann, Rua Joao Moura 434, 05412-001 Sao Paulo, BRAZIL.)

"This is the final volume of a work covering the weeds and grasses of South America, focusing on Brazil. It is intended as a practical guide for agronomists rather than academic botanists."

This hardbound handbook treats terrestrial and aquatic weeds. Each problem plant is described and pictured by a color photograph, and the synonymy, taxonomy, distribution, economic importance, biology and morphology (including fruits) are presented. There are indices for scientific and for common names.

The photographs are excellent and the quality of the publication in general is exceptional.

FLORA Y VEGETACION DE LAS LAGUNAS Y HUMEDALES DE LA PROVENCIA DE CUENCA, by S. Cirujano. 1995. 224 pp. (In Spanish.)

(For ordering information, contact Dr. Santos Cirujano Bracamonte, Consejo Superior de Investigaciones Científicas, Real Jardin Botánico, Plaza de Murillo, 2-28014 Madrid, SPAIN, (91) 420 30 17. Ext. 208.)

This hardbound book represents a systematic study of the aquatic plants of the "lagoons" and wetlands of Cuenca Province, Spain. During a three-year

study, one hundred ninety-six sites were inventoried: 61 taxa of hydrophytes as well as 57 taxa of hygrophilous plants and helophytes were identified. Phytosociological classes also were identified, including 27 plant communities.

FENS AND BOGS IN THE NETHERLANDS: VEGETATION, HISTORY, NUTRIENT DYNAMICS AND CONSERVATION, edited by J.T.A. Verhoeven. 1992. 490 pp.

(Order from Kluwer Academic Publishers Group, P.O. Box 989, 3300 AZ Dordrecht, THE NETHERLANDS. US\$239.00.)

This book includes ten chapters about peatland ecosystems by a dozen Dutch scientists. They present detailed pictures of the geology, land use, history, palaeoecology, ecology and conservation of peatlands in The Netherlands.

OUR LIVING RESOURCES: A REPORT TO THE NATION ON THE DISTRIBUTION, ABUNDANCE, AND HEALTH OF U.S. PLANTS, ANIMALS AND ECOSYSTEMS, edited by E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran and M.J. Mac. 1995. 530 pp.

(Order from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Stock #024-010-00708-7. \$44.00)

In this beautifully produced book, nearly 200 articles are collected and edited by the National Biological Service (US Department of the Interior), which hopes to "stimulate new work on the status and trends of biological resources."

"The report compiles, for scientists, managers, and the lay public, information on many species and the ecosystems on which they depend...it brings together for the first time a host of information about our nation's biological wealth, highlighting causes for both comfort and concern."

It includes sections on the distribution, abundance and health of birds, mammals, reptiles and amphibians, fishes, invertebrates and plants, as well as terrestrial and aquatic ecosystems and ecoregions; and contains many discussions on "special issues" such as global climate change, human influences, non-native species and habitat assessments.

Meetings

VTH INTECOL INTERNATIONAL WETLANDS CONFERENCE. September 22-18, 1996. Perth, Australia. University of Western Australia.

Co-sponsored by the Society of Wetland Scientists, *Wetlands for the Future* is the theme for the 1996 conference. The conference will emphasize our understanding of wetlands now, the importance of conservation and management, and the role of technology in maintaining wetlands in the future.

For more information, contact J. Davis, School of Biological and Environmental Sciences, Murdoch University, Murdoch, Western Australia 6150. Phone 61 9 360 2939; e-mail: davis@essun1.murdoch.edu.au

23RD ANNUAL CONFERENCE ON ECOSYSTEMS RESTORATION AND CREATION. May 16-17, 1996. Tampa, Florida.

Sponsored by the Hillsborough Community College Institute of Florida Studies, this annual conference provides a forum for the nationwide exchange of results of scientific research in the restoration, creation and management of wetlands and upland systems.

For more information, contact F.J. Webb, Dean of Environmental Programs, Hillsborough Community College, Plant City Campus, 1206 N. Park Road, Plant City, FL 33566, 813/757-2104.

IXTH INTERNATIONAL SYMPOSIUM ON BIOLOGICAL CONTROL OF WEEDS. January 21-26, 1996. Stellenbosch, South Africa.

As in the previous symposia, all aspects of the theory and practice of biological weed control will be covered.

For more information, contact J.H. Hoffmann, Zoology Department, University of Cape Town, Rondebosch 7700, South Africa.

SYMPOSIUM ON NON-NATIVE ORGANISMS IN WESTERN AQUATIC ECOSYSTEMS, AND THE ANNUAL MEETING OF THE WESTERN AQUATIC PLANT MANAGEMENT SOCIETY. March 27-29, 1996. Portland, Oregon.

The Symposium will feature speakers who will discuss a number of non-indigenous aquatic pest species, including fish, plants and insects. The WAPMS will meet concurrently with western chapters of the North American Lake Management Society (NALMS). WAPMS issues will include aquatic plant biology, ecology and management. The NALMS chapter meetings will be for lay people and will feature lake management issues.

For more information, contact M. Sytsma, Biology Department, Portland State University, POB 751, Portland, OR 97207; 503/725-3833; e-mail: h2ms@odin.cc.pdx.edu

FLORIDA LAKE MANAGEMENT SOCIETY ANNUAL CONFERENCE. May 22-24, 1996. Ocala, Florida.

The theme of this seventh annual conference is, *Decision Making in Lake Management*.

For information, contact M. Hoyer, U.F. Department of Fisheries and Aquaculture, 7922 NW 71 ST, Gainesville, FL 32653; 904/392-9617 X 227.

IVTH SYMPOSIUM ON BIOGEOCHEMISTRY OF WETLANDS. March 4-6, 1996. New Orleans, Louisiana.

Sponsored by the Louisiana State University Wetland Biogeochemistry Institute and co-sponsored by the University of Florida, the meeting will emphasize biogeochemical processes occurring in freshwater, estuarine and saline wetlands.

For more information, contact K. Gros, Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge, LA 70803-7511; 504/388-8810; e-mail: cowgro@lsuvm.sncc.lsu.edu

DOMESTICATION, PRODUCTION AND UTILIZATION OF NEW CROPS: PRACTICAL APPROACHES. July 8-10, 1996. University of Southampton, United Kingdom.

Sponsored by the International Centre for Underutilised Crops (ICUC), this three day conference will feature discussions of sources of new crops, mechanics of crop development and utilisation and marketing.

For more information, contact N. Haq, Conference Secretariat, International Centre for Underutilised Crops, Building 62, University of Southampton, Southampton S016 7PX, United Kingdom.

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AQUAPHYTE

This is the newsletter of the Center for Aquatic Plants and the Aquatic Plant Information Retrieval System (APIRS) of the University of Florida Institute of Food and Agricultural Sciences (IFAS). Support for the information system is provided by the Florida Department of Environmental Protection, the U.S. Army Corps of Engineers Waterways Experiment Station Aquatic Plant Control Research Program (APCRP), the St. Johns River Water Management District and UF/IFAS.

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AQUAPHYTE is sent to more than 5,500 managers, researchers and agencies in 87 countries. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

Inclusion in *AQUAPHYTE* does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.

Careers in Florida's Freshwater Environments

A New Environmental Education Video for Kids

When you ask middle school students in Florida what they want to be when they grow up, the answers are, "I want to be a professional football player", and "I want to be a nurse". Though we will always need medical workers, and football players are extremely important to us all, there are and will be openings in other

occupations, such as those that protect and manage our aquatic environments. For various reasons, school children do not know this.

Here is a fast-paced 26-minute musical video, which introduces about 40 "freshwater occupations". It was produced especially for and has been field-tested on 7th and 8th grade students (though students in other grades also will benefit from it). Middle school science teachers helped produce this program.

It was partially funded by the Florida Advisory Council on Environmental Education, (FACEE) which in turn is funded by the sales of the *Save the Manatee* and *Panther* state license tags.

The *Careers* video (VT1236) and booklet will be distributed free to Florida science teachers and career counselors. For all others, the cost is \$15, plus S/H. Call the APIRS office for free copies; to purchase, call IFAS Publications, (352) 392-1764.

Environmental Education

Careers in Florida's Freshwater Environments

Produced especially for and tested on 7th and 8th grade students. Other students, grades 4 - 10, also will learn something from this program

This fast-paced, musical video introduces students to the many occupations needed to protect and preserve our lakes, rivers, and wetlands.

This video was designed to be used during one class period. If, at the bell, the teacher quickly introduces the video and then shows it, there will be time for about 15 minutes of focused discussion about freshwater environmental careers.

Be sure to refer to the accompanying booklet of the same title which gives more details about the occupations depicted.

Viewing Notes To Teachers

- 1 Close the curtains
- 2 Turn off the lights
- 3 Play it loud!

December 1995
VHS - Length: 26 minutes
FAS Videotape #VT - 1236